The revenue for a company selling *x* units is $R = 900x - .1x^2$. Use differentials to approximate the change in revenue if sales increase from *x* = 3000 to *x* = 3100 units.

$\frac{dR}{dx} = 900 - .2x$ $\quad [900 - .2(3000)]100$

Graph the function using the first and second derivative test. $f(x) = x^{1/3} + 1$.

$f'(x) = \frac{1}{3x^{2/3}} = 0$

Never $= 0$:(

Undefined @ $x = 0$

$+ \quad | \quad +$

0

→ No local max|min

$f'(x)$ doesn't change signs

Second Derivative Test

$f''(x) = \frac{-2}{9x^{5/3}}$

$f''(x)$ is never 0

$f''(x)$ is undefined @ $x=0$

$+ \quad | \quad -$ → point of Inflection

0

Concave up

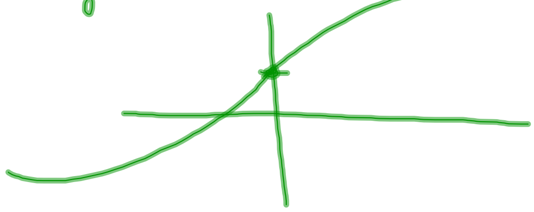
Concave down

Concave up Concave down

Combined

$++ \quad | \quad +-$

0



Apr 16-10:43 AM

EXAMPLE 3 Finding Points of Inflection and Intervals of Concavity

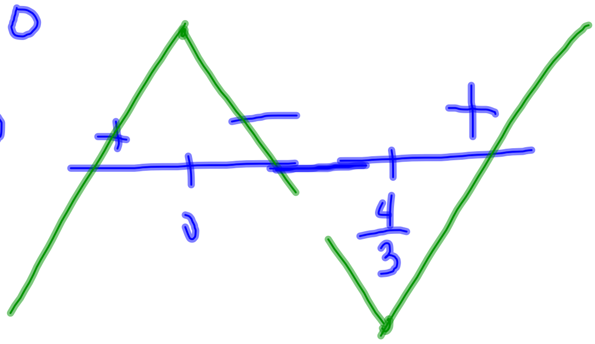
Find the points of inflection of $f(x) = 3x^5 - 5x^4 + 1$ and determine the intervals where $f(x)$ is concave up and down.

$f(x) = 3x^5 - 5x^4 + 1$

$f'(x) = 15x^4 - 20x^3 = 0$

$5x^3(3x-4) = 0$

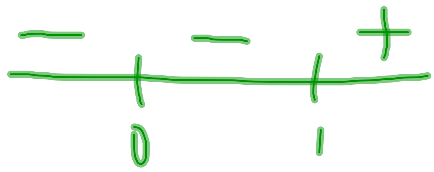
$x = 0 \quad x = \frac{4}{3}$



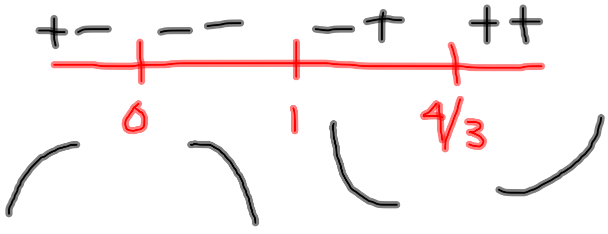
$f''(x) = 60x^3 - 60x^2 = 0$

$60x^2(x-1) = 0$

$x = 0 \quad x = 1$



Combination of Both tests

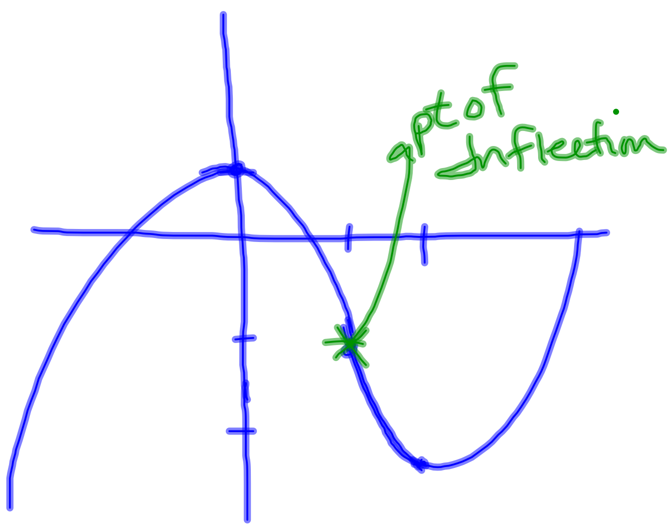


get values for my critical pts.

$(0, 1)$

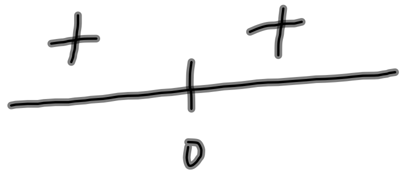
$(1, -1)$

$\left(\frac{4}{3}, -2.16\right)$

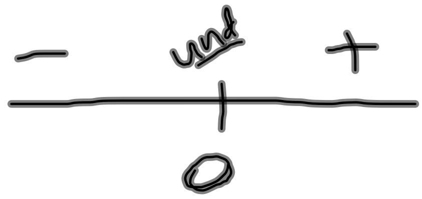


EXAMPLE 4 A Case Where the Second Derivative Does Not Exist Find the points of inflection of $f(x) = x^{5/3}$.

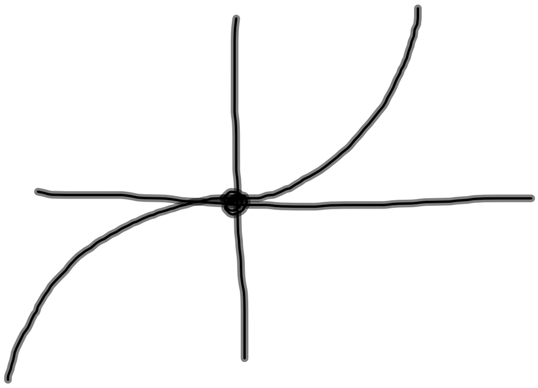
$$f'(x) = \frac{5}{3}x^{2/3}$$

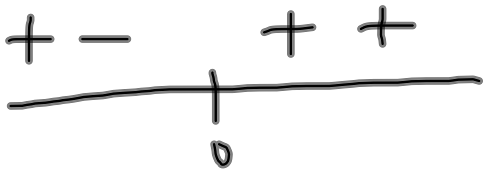


$$f''(x) = \frac{10}{9}x^{-1/3}$$



$$f''(x) = \frac{10}{9x^{1/3}}$$





p. 242
1–9 prelim
Ex: 1–6, 7, 10, 14, 37, 41

May 2-7:57 AM

Apr 16-10:44 AM